Lean Manufacturing & the Environment

Opportunities for Environmental Improvement

Lean manufacturing is a business model and collection of methods that focuses on the elimination of many types of waste while delivering quality products on time and at least cost. EPA is interested in finding ways to maximize the environmental benefits of lean.

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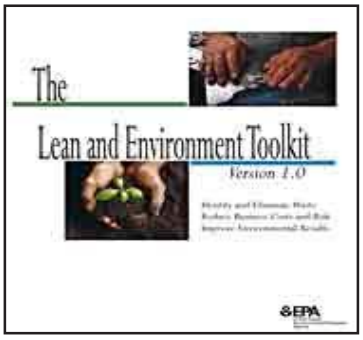
The Lean and Environment Toolkit, a collaboration between EPA and its partners, provides practical strategies for using Lean to reduce environmental waste. Using the tools enhances Lean results - waste elimination, quality enhancement, delivery of value to customers - while helping to protect the environment. You can find more information on the toolkit at: http://www.epa.gov/lean/toolkit



Background

Lean manufacturing is a business model that emphasizes eliminating waste while delivering quality products at the least cost to the manufacturer and customers. In this context "waste" refers to inefficiencies of all kinds, ranging from time and movement to energy and materials. In the U.S., lean implementation began in the 1980's in the automotive and aerospace sectors. Today, lean initiatives are spreading rapidly in numerous manufacturing and service sectors.

Lean thinking focuses on three objectives:

- Reducing production resource requirements by minimizing inventory, equipment, storage and production space, and materials;
- Increasing manufacturing velocity and flexibility; and
- Improving quality and eliminate defects.

Lean methods create a *continual improvement-based, waste elimination culture* that involves workers at all levels of the organization. There are a variety of common lean methods, including *Kaizen* (Japanese for improvement) rapid improvement events, just-in-time manufacturing, value stream mapping, total productive maintenance, cellular production (or synchronous, single-piece flow manufacturing). Six Sigma is a closely related business strategy focused on maximizing quality.

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Lean and the Environment

An October 2003 U.S. Environmental Protection Agency (EPA) report (see http://www.epa.gov/innovation/lean) examines the relationship between lean and the environment and points out opportunities for further enhancing organizations' environmental performance through their lean initiatives.

Some key findings:

- ***Lean produces an operational and cultural environment that is highly conducive to waste minimization and pollution prevention.*** Significant environmental benefits typically ride the coattails of lean initiatives. The powerful economic and competitiveness drivers behind lean drive a willingness to undertake substantial operational and cultural changes, many of which have important environmental performance implications. Lean typically results in less material use, less scrap, reduced water and energy use, and decreased number and amount of chemicals used.
- ***Lean can be leveraged to produce even more environmental improvement.*** Although lean currently produces environmental benefits and establishes a systemic, continual improvement-based waste elimination culture, lean methods do not explicitly incorporate environmental performance considerations, forgoing some environmental improvement opportunities. Lean provides an excellent platform for broadening companies' definition of "waste" to address environmental risk and product life-cycle considerations, as some lean practitioners have demonstrated.
- ***Some regulatory issues can be encountered when applying lean to environmentally sensitive processes.*** The flexible, and rapidly changing operating approach used in lean manufacturing is quite different from traditional manufacturing operations and can be challenging to use in environmentally-sensitive manufacturing processes such as painting and coating. Some lean practitioners believe this results in situations where either environmental performance improvements can be constrained or the risk of non-compliance increases.
- ***Environmental agencies have a window of opportunity - while companies are embarking on lean initiatives and investments - to collaborate with lean promoters to further improve the environmental benefits associated with lean.*** There is a strong and growing network of organizations promoting lean. These organizations share a goal with organizations promoting environmental improvement and pollution prevention—both strive to eliminate waste from business. At present, however, there is very little coordination or collaboration between the environmental and lean networks.

EPA and Lean

Recognizing that lean trends have implications for both regulatory and non-regulatory programs, EPA is working with lean experts, organizations implementing lean, state environmental agencies, and other partners to:

- Raise awareness about the relationship of lean production to environmental performance.
- Share "good practices" for improving the environmental benefits of lean initiatives.
- Develop and disseminate integrated lean and environment tools.
- Identify and address environmental regulatory considerations associated with lean.
- Explore how lean techniques might be used to improve government administrative processes (e.g., permitting).

EPA is working with partners in a number of industry sectors and in government agencies to document lean and environment success stories and to develop and test tools that organizations could use to maximize the environmental benefits of lean. In addition, EPA is conducting outreach about lean and the environment to lean practitioners and pollution prevention (P2) technical assistance providers. Finally, EPA is working with states to apply lean techniques to streamline permitting.

Further Information

More information about EPA's lean and environment activities and research is available on EPA's Lean website: http://www.epa.gov/lean.

United States
Environmental Protection
Agency

Office of Policy,
Economics and Innovation
(1807T)

September 2005
EPA-231-F-05-003